UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
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STATINTL

Central Intelligence Agency
Headquarters Building, Room 2E23
Washington, D.C.   20505

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In her phone conversation with you today, Miss Walkowicz summarized
briefly one of the NBS/ACM/NSF "Conferences," or cooperative ventures
which have been continuing over the past several years. This one has
to do with job descriptions for computer-related occupations. A
summary report of that meeting is enclosed, together with a list of
participants.

As so many worthwhile endeavors, this project has continued to operate
on the proverbial shoestring, with participants contributing their
time and effort. The Action Plan that was developed at the Planning
Workshop meeting is being implemented slowly. The Workshop participants
decided to use a technique developed by one of the participants,
Dr. Raymond Berger, for the description of three computer-related
occupations: programmer, systems analyst, and computer operator. The
technique consists of identifying descriptors of tasks and associated
skills relevant to each occupation. This collection of descriptors,
then, can be combined and assembled to fit the requirements of indi-
vidual jobs in the relevant occupation category.

The programmer job has been completed. However, the systems analyst
job is in need of $25,000 in order to bring it to completion. The
enclosed Proposal gives a more detailed description of progress to
date, and plans for completion of this phase of the effort.

The total cost of the project is estimated at $25,000. AFIPS will
provide $10,000, NBS will provide the technical support required, and
we are looking to other agencies to supply the remaining $15,000.
The monies would be pooled and forwarded to AFIPS for completion
of the project.

I would appreciate your consideration of this request, and will be glad
to supply any additional information you may require. I may be reached
on (301) 921-3531.

Sincerely,

S. Jeffery, Chief
Systems and Software Division

Enclosures

CONFERENCE ON COMPUTER-RELATED PERSONNEL

Twelve invitees to the Planning Workshop for the above Conference met at NBS on April 16 and 17, 1974, to study how best to achieve its objectives. The principal of the assigned objectives was the identification of basic computer-related occupation categories and the definition of each in terms of job titles, work content, responsibilities and skill requirements. Once this basic structure was defined, a framework would be provided for other needs such as the identification of criteria for development and evaluation of educational and training facilities, for correlation of these facilities with changing skill requirements, identification of emerging changes or new occupations within the basic structure, and identification of forecasting capabilities and requirements.

After considerable and vigorous discussion of these objectives, the Planning Workshop decided that the primitives of concern were jobs and skills, that a set of definitions could be developed, based on an initial core of skill descriptors which could be correlated with actual jobs. A certain set of such descriptors common to actual jobs in many organizations could then be used as standard descriptions for these jobs. The Planning Workshop then established three Task Groups each of which was assigned responsibility for developing a set of descriptors/ skills for describing one of the three occupations to which the members decided to devote first attention: programmers, systems analysts, and computer operators. Chairmen were appointed and tentative meeting dates were set. The Task Groups for programmers and operators will meet concurrently in late May or early June; the Task Group for Systems Analysts is tentatively planning to meet in September 1974. The Groups will meet at locations that will minimize travel for participants. Mr. J. David Benenati of The Bendix Corporation, Southfield, Michigan, agreed to serve as Chairman of the Task Group for Operators; and Dr. Raymond Berger, President of Psychometrics, Inc., Los Angeles, will be Chairman of the other two Task Groups.

The Task Group meetings comprise Step I of the Action Plan developed for achieving Conference objectives. Three other Steps complete the Plan:

*Step II - Disseminate material developed by the Task Groups
        for critique and assessment of impact*
*Step III - Reconvene Planning Workshop for review of results
        of Steps I and II*
Step IV - Decide on Follow Action Plan

Activity under Step I is pr eding slowly. To date, the programmer occupation was completed; the job descriptors developed are presented in an AFIPS Report entitled, "Computer Programmer Job Analysis. Reference Text," by Raymond M. Berger. Analysis of the systems analyst occupation is nearing completion. The Task Group on Computer Operators met once and developed a plan for proceeding with their assignment. However, because of budgetary and other constraints, considerable additional effort is still required on this occupation.

LIST OF PARTICIPANTS

Task Force Planning Workshop
Conference on Computer-Related Personnel
April 16-17, 1974

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Proposal

SYSTEMS ANALYST JOB DESCRIPTION PROJECT: SURVEY OF NATIONAL SAMPLE

Introduction

This proposal concerns the completion of the Systems Analyst
Job Description Project. Attachment A is an outline of the
working model of the project as approved by the AFIPS Exe-
cutive Board. This model follows the procedure used success-
fully in the AFIPS Computer Programmer Job Description.
Much of the work accomplished to date has been facilitated
by the cooperative effort of an NBS review committee. Tasks
4 and 5 in Attachment A are the focus of this proposal.

The proposal is divided into two sections: Work Accom-
plished, Work in Progress, and Plans for Completion (the
national survey of systems analysts). A cost estimate is
attached.

Work Accomplished

Two major tasks were undertaken in the preliminary phases
of this project. The first was to develop a taxonomy for
the categorization of systems analysis (SA) tasks and
skills, and the second was to develop a general list of SA
task and skill statements and an appropriate Background
Data Form.

As part of the effort to accomplish these goals, meetings
were held with a California review committee in Los Angeles
and with the National Bureau of Standards SA Job Descrip-
tion Committee in Washington, D.C. In attempting to re-
solve the differing philosophies and approaches on the SA
job structure, the taxonomy underwent continuous modifica-
tion. A "life-cycle" taxonomy received general favor, but
in applying this kind of categorization it was found by
the NBS committee that the life-cycle structure did not al-
ways fit the various tasks and skills.

A second problem became apparent with the list of general
SA tasks that had been developed. Systems analysts who
were business applications oriented found (in a pilot study)
that much of the task list was more applicable to scienti-
fic or military systems than to their particular systems
area.

As a result of these difficulties with taxonomy and task orientation, it was decided that a second list should be developed for systems analysts in business applications, and that the life cycle approach would influence but not rigidly prescribe the categorizing of the tasks.

The principal effort in recent months was the generation of a business applications SA task list. To avoid the scientific and military systems bias of the first list, it was decided to start from scratch in developing the new list. The sequence of work events below resulted in a list of such merit that the original scientific list was revised along the same lines.

(1)   A review was made of the literature dealing with the business SA job and a preliminary list of task statements was derived.

(2)   A committee was formed with Harold Ellis of the L.A. DWP and UCLA, Douglas Meecham of Hughes, Dr. Norman Willmorth of SDC, and Dr. Ray Berger. Six day-long working sessions and several night sessions were held from March to just prior to the NCC meetings in May. Using the preliminary list as a starting point, the committee restructured the taxonomy into a modified life cycle and produced extensive revisions and additions to the task list.

(3)   The skills list developed in the previous phase of the project was reviewed by the above committee to see if it could remain applicable as a common list to all the systems analysis applications (scientific, military systems, business, or other). It was decided to retain the single skills list but to amplify and restructure it. This work was accomplished subsequently by Willmorth and Berger, and the resulting list was reviewed by Elizabeth Alexander of Con Ed in New York, an NBS committee member. Ms. Alexander made some useful suggestions that went into a further revision.

(4)   The list of scientific/engineering/military SA tasks was restructured and augmented to make it consistent with the form and content of the business applications list.

Work in Progress

The work in progress is concerned primarily with the Delphi or expert opinion phase of the project. At the May 1975 NCC, systems analysts were asked to participate in the evaluation of the SA task and skill lists. The greater proportion of volunteers were involved in the business applications area, but there were sufficient numbers of respondents to conduct Delphi evaluations for both task lists, especially when augmented with people recommended by the NBS committee.

In allowing for vacation schedules it was decided not to try to conduct the Delphi during the summer. Efforts in July and August included further refinement of the Scientific/Engineering/Military SA list, and a meeting with some of the NBS committee on July 15. Josephine Walkowicz of NBS, Nancy Ayer of the Dept. of Agriculture, Paul Oyer of the U.S. Census Bureau, and Ray Berger met in Washington, D.C., to review the SA task and skill lists. The reviews resulted in some further editing. Additional Delphi participants were recommended by the committee.

A "mini-Delphi" was held in Los Angeles with three scientific/military and three business SA experts to discover problems that might arise (with respect to wording, redundancy, etc.) in the national Delphi effort. The results of the mini-Delphi have been incorporated into a major editing effort of the lists just prior to conducting the national Delphi evaluation.

The edited lists are to be mailed to the Delphi participants shortly. The returned evaluations will be tabulated and the results mailed to the participants along with instructions for making second iteration evaluations. The results of the second iteration will be tabulated and analyzed. Tasks and skills receiving moderate to high importance ratings will constitute the "Ideal" Systems Analyst Job Descriptions in the scientific and business areas.

Proposed Plans for Completion of the National Survey of Systems Analysts

It is planned to submit essentially the same lists used in the Delphi phase to a representative national sample of systems analysts. The importance of a field survey is to establish what a systems analyst does on the job (as opposed to what the Delphi experts believe he should do, ideally). The AFIPS Computer Programmer Job Analysis demonstrated the utility of the national survey.

The steps in conducting the survey will be: (Steps 1, 2 and 3 are parallel activities in terms of time.)

(1) Revision of SA Job Description Lists. The results of the Delphi evaluation will be used to revise specific items of the task and skills lists. It is planned that few substantive changes in the item content will be made so that Survey and Delphi results may be directly compared. Generally, these changes will entail clarification of terms and addition of examples to individual items. Complex items may be broken up in cases where some SA's respond positively to one feature of a task definition, and others respond negatively to another feature.

The Delphi participants will be asked to recommend other tasks and skills that should be on the lists. These will be added to the Survey lists if generally deemed important.

(2) Preparation of the Survey Booklets. The tasks and skills lists will be compiled in booklet form with complete instructions for rating the items. A mark sense sheet will accompany each booklet so that the responses can be processed for computer analysis easily and economically.

Two Survey booklet forms will be prepared: one for the business applications SA, and the other for the scientific/engineering and military systems SA.

(3) Selection of National Sample of SA's. The SA's will be sampled by using the stratified-random method. This will be done in two steps:

(a) Organizations with data-processing facilities will be randomly sampled within several strata. The stratification will be in terms of organizations of different sizes, different applications, and geographic areas to assure representativeness.

(b) A specified proportion of the SA's in each organization in the sample will be selected. Variables such as amount of experience and application area will be factors in the selection. The target sample size is 500 to 700 in the two major groups (Business and Scientific/Engineering/Military).

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(4) Contacts with Organizations. Contacts will be made
     with organizations through the auspices of AFIPS
     and NBS to enlist cooperation for the Survey. Ano-
     nymity will be assured to organizations and to in-
     dividual participants.

(5) Analysis and Reports. The analysis and reports
     will follow the model for the Computer Programmer
     Job Analysis and the final report will be format-
     ted to be in publishable form. A draft of the re-
     port will be prepared for review by appropriate
     committees at NBS and AFIPS prior to final editing.

Duration of Project

Sampling, data collection, and analysis of survey results:
    5 months

Preparation of report: 3 months

Total estimated duration: 8 months

ATTACHMENT A

OUTLINE OF SYSTEMS ANALYST JOB DESCRIPTION PROJECT

Task 1: Define the taxonomy and scope of systems analysis activities and skills.

  1.1 Prepare categorizational framework of systems analyst's job.

  1.2 Compile relevant tasks and skills for the various categories.

  1.3 Preliminary review and revision of taxonomy and descriptors by systems analyst managers and senior systems analysts.

Task 2: Establish job activities and skills lists.

  2.1 Assessment of the preliminary tasks and skills lists by a panel of individuals actively engaged in systems analysis work.

  2.2 Revise and consolidate the systems analysis task and skills lists.

Task 3: Conduct evaluation of job activities and skills (Delphi approach).

  3.1 Arrange for groups of recommended systems analysis experts to participate in the Delphi evaluation of the job descriptions.

  3.2 Conduct Delphi evaluation of job activities and skills by panels of business applications and scientific/engineering systems analysts.

  3.3 Analysis of results and revision of lists for survey in Task 4.

Task 4: Conduct a survey of a national sample of systems analysts.

  4.1 Prepare survey booklets with lists of job activities and skills to be rated.

4.2 Sample systems analysts by using stratified-random method in which organizations with computer facilities are randomly sampled. A proportionate number of systems analysts from each organization will be asked to participate anonymously. Target sample size will be 500 to 700 for each of the two systems analyst areas. This number will allow reliable segmentation into subgroups of interest.

4.3 Data collection and analysis of survey results.

Task 5: Preparation of report to NBS and AFIPS on the systems analyst job description project.

5.1 Write draft of the project report.

5.2 Review of draft by NBS and AFIPS committees.

5.3 Editing of revised draft.

5.4 Preparation of final report. Camera-ready copy will be submitted to NBS and AFIPS for printing.

Systems Analyst Job Description Project:
Survey Phase

COST ESTIMATE

Professional and Technical

Project Director, R.M. Berger, Ph.D. 46 days @ 200. (includes office facilities, equipment, and other overhead items)	9,200.
Consultants (systems analysis experts) 5 days @ 150.	750.
Research Associate, 50% time for 8 months @ 12,000. (annual rate)	4,000.
Data Processor, 100 hours @ 10. per hour	1,000.

Clerical

Typist/clerk, 20% time for 8 months @ 8,400. (annual rate)	1,320.

Employee Benefits

10% of professional and clerical salaries (non-consultant)	1,452.

Computer Time

500.

Phone

Long distance calls to participants, etc.	550.

Supplies and Postage

700.

Printing

Survey booklets and Op Scan Sheets (also includes miscellaneous Xerox duplication)	4,500.

COST ESTIMATE (Cont'd)

Travel

Two trips, L.A. to East, for project conferences $ 988.00
  with NBS/AFIPS committee:
  1. review proposed survey materials
     prior to printing
  2. review draft of final report

Round trip air coach; ground transportation;
  hotel accomodations
                                                     _____

                                    Total $25,000.00

                        Cost to NBS: 15,000.00
                        Cost to AFIPS: 10,000.00

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